

## CLAIMS

What is claimed is:

1. A free-space parallel optical interconnect, comprising:
  - a first module, comprising:
    - a first die comprising an array of light sources, each light source emitting light; and
    - a first common lens for directing the light from each light source to a second module;
  - the second module.
2. The interconnect of claim 1, wherein the array of light sources is selected from the group consisting of an array of vertical cavity surface-emitting lasers (VCSELs), an array of edge-emitting lasers, and an array of light emitting diodes (LEDs).
3. The interconnect of claim 1, wherein the light sources are spaced apart by 50 microns.
4. The interconnect of claim 1, wherein:
  - the first die further comprises an array of detectors; and
  - the first common lens further directs light from the second module to the detectors.
5. The interconnect of claim 1, wherein the first module further comprises:
  - a second die comprising an array of detectors; and
  - the first common lens further directs light from the second module to the detectors.
6. The interconnect of claim 1, wherein the first module further comprises:
  - a second die comprising an array of detectors; and

a second common lens for directing light from the second module to the detectors.

7. The interconnect of claim 1, wherein the second module comprises:
  - a second die comprising an array of detectors; and
  - a second common lens for directing the light from each light source to a corresponding detector.
8. The interconnect of claim 7, wherein the array of detectors comprises an array of positive-intrinsic-negative (PIN) photodiodes.
9. The interconnect of claim 7, wherein the detectors are spaced apart by 50 microns.
10. The interconnect of claim 7, wherein:
  - the second die further comprises a second array of light sources, each light source emitting light; and
  - the second common lens further directs the light from the second module to the first module.
11. The interconnect of claim 7, wherein the second module further comprises:
  - a third die comprising another array of light sources, each light source emitting light; and
  - the second common lens further directs the light from the second module to the first module.
12. The interconnect of claim 7, wherein the second module further comprises:
  - a third die comprising another array of light sources, each light source emitting light; and
  - a third common lens for directing the light from the second module to the first module.
13. A method for transmitting data in parallel, comprising: ~

emitting light from each light source in an array of light sources in a first module, wherein the light from each light source carries data; and

directing the light from each light source with a first common lens to a second module.

14. The method of claim 13, further comprising:

directing light from the second module with a second common lens to detectors in the first module.

15. The method of claim 13, further comprising:

directing light from the second module with the first common lens to detectors in the first module.

16. The method of claim 13, further comprising:

directing the light from each light source with a second common lens to a corresponding detector in an array of detectors in the second module.

17. The method of claim 13, further comprising:

emitting light from each light source in a second array of light sources in the second module; and

directing the light from the second module with a second common lens to the first module.

18. The method of claim 11, further comprising:

emitting light from each light source in a second array of light sources in the second module; and

directing the light from the second module with the first common lens to the first module.